Roll No. [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CE) (Sem.–3rd) (2011 Batch)

FLUID MECHANICS-I

Subject Code : BTCE-301

Paper ID : [A1113]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a. Describe in brief compressibility and viscosity.

   b. Describe the different sub groups of non-newtonian fluid, giving example of each.

   c. Explain Pascal's Law.

   d. Differentiate between Drag and Lift.

   e. Write Euler's Equation.

   f. What is Metacentric Height?

   g. Derive the equation of stream function.

   h. Derive the equation for actual discharge in an office meter.

   i. What do you understand by Kinematic Similarity?

   j. How the discharge in a venturimeter will change if its orientation changes?

SECTION-B

2. Explain the three conditions of equilibrium developed when a floating body is given a sight angular displacement.

3. How can you describe the flow patterns and give the individual description of each pattern?

4. Derive the equation of stream function and velocity potential for a uniform stream of velocity v in a two dimensional field, the velocity v being inclined to the x-axis at a positive angle a.

5. Derive Borda-Carnot equation of head loss.

6. A 15 Kw pump with 80% efficiency is discharging oil of specific gravity 0.85 to the overhead tank. If losses in the whole system are 1.75 m of flowing fluid, find the discharge. The difference in elevation between overhead tank oil level and lower tank oil level is 20 m.

SECTION-C

7. A rectangular plate 1 m wide and 1.5 m deep is held vertically in water so that its upper horizontal edge is 1.25 m below the free surface. Find the total water pressure on one face of the plate and depth of centre of pressure.

8. A pitot tube is mounted on an airplane to indicate the relative speed of the plane. What differential pressure intensity will the instrument register when the plane is travelling at a speed of 200 km/hr in a wind blowing at 60 km/hr. against the direction of motion of the plane ? Take sp. wt. of air as 11.9 N/m^2. Assume Cv = 0.98.

9. A plate of 1m × 1m moves through air of density 1.15 kg/m^3 at 36 km/hr. Determine the drag force, lift force and resultant force. Take Cd = 0.18 and Cl = 0.70.